Measles Mortality in the United States 1971-1975

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Abstract: During 1971-75, an average of 35.4 measles-related deaths were recorded each year; one death for every 1,000 measles cases reported. Measles mortality rate was highest in children under 1 year of age, as was the death-to-case ratio. Mortality rates were higher in non-metropolitan than in metropolitan counties. Measles mortality rates were inversely related to median family income. (*Am J Public Health* 1980; 70:1166-1169.)

Introduction

Since its licensure in 1973, the widespread use of measles vaccine has resulted in a greater than 90 per cent reduction in reported measles incidence in the United States. Comparable declines have been seen in reported deaths due to measles (Figure 1). Barkin studied death certificate data for measles mortality for a prevaccine period (1958-1963) and during the vaccine era (1965-1970).[1, 2] Highest measles mortality rates were for children 6-11 months of age in areas with fewer than 10,000 people, and in counties where more than 60 per cent of the population had incomes below poverty level. The death-to-case ratio was highest for children who developed measles when less than 1 year of age, lowest in children ages 8-15 years, and rose again in persons over 25 years of age. This report reviews death certificate information recorded by the National Center for Health Statistics (NCHS) for the period 1971-75.

Materials and Methods

Demographic data on deaths attributable to measles in the United States were obtained from the NCHS mortality tapes for the period 1971-75. In 1972, only a 50 per cent survey of mortality was done so the data for that year are incomplete. Hence, although a total of 177 deaths were attributed to measles during the period 1971-75, data are available from the tapes on only 165 of them. The tapes list underlying cause of death, age, sex, date of death, state and county of residence, and whether the residence was in a metropolitan or non-metropolitan area.*

Population data were obtained from estimates of the U.S. population as of July 1, 1973, by the US Bureau of the Census.[3] Data on reported measles cases were obtained from the weekly reports of measles cases obtained by CDC from state and local health departments.[4, 5] Measles cases were reported by age beginning in 1973. Data on median family income by county were obtained from the US Bureau of the Census for 1972.[6]

Results

A total of 177 deaths due to measles was recorded during the five-year period 1971-75, an average of 35.4 deaths per year (Table 1). Death rates due to measles have paralleled reported measles case rates (Figure 1) and have shown a striking decline since the licensure of measles vaccine in 1963.

The average annual mortality rate for measles in the US was 0.17 per million population. Seven states (Alabama, Kansas, Kentucky, Mississippi, Missouri, Montana, and South Dakota) had rates more than twice the national average. The average death-to-case ratio was one death per 1,000 reported cases (Table 1).

Eighty-two deaths attributed to measles occurred in

TABLE 1—Reported Measles Morbidity and Measles Deaths, United States 1971-1975

Year	Reported Measles Cases	Reported Measles Deaths	Death Rate per Million Population	Deaths per 1000 Reported Measles Cases
1971	75,290	90	.44	1.20
1972	32,275	24	.12	0.74
1973	26,690	23	.11	0.86
1974	22,094	20	.09	0.90
1975	24,374	20	.09	0.82
Annual average 1971-75	36,144.6	35.4	.17	0.98

*The condensed tapes available at the Center for Disease Control in Atlanta did not include race nor Standard Metropolitan Statistical Area; these characteristics are therefore not included in this report.

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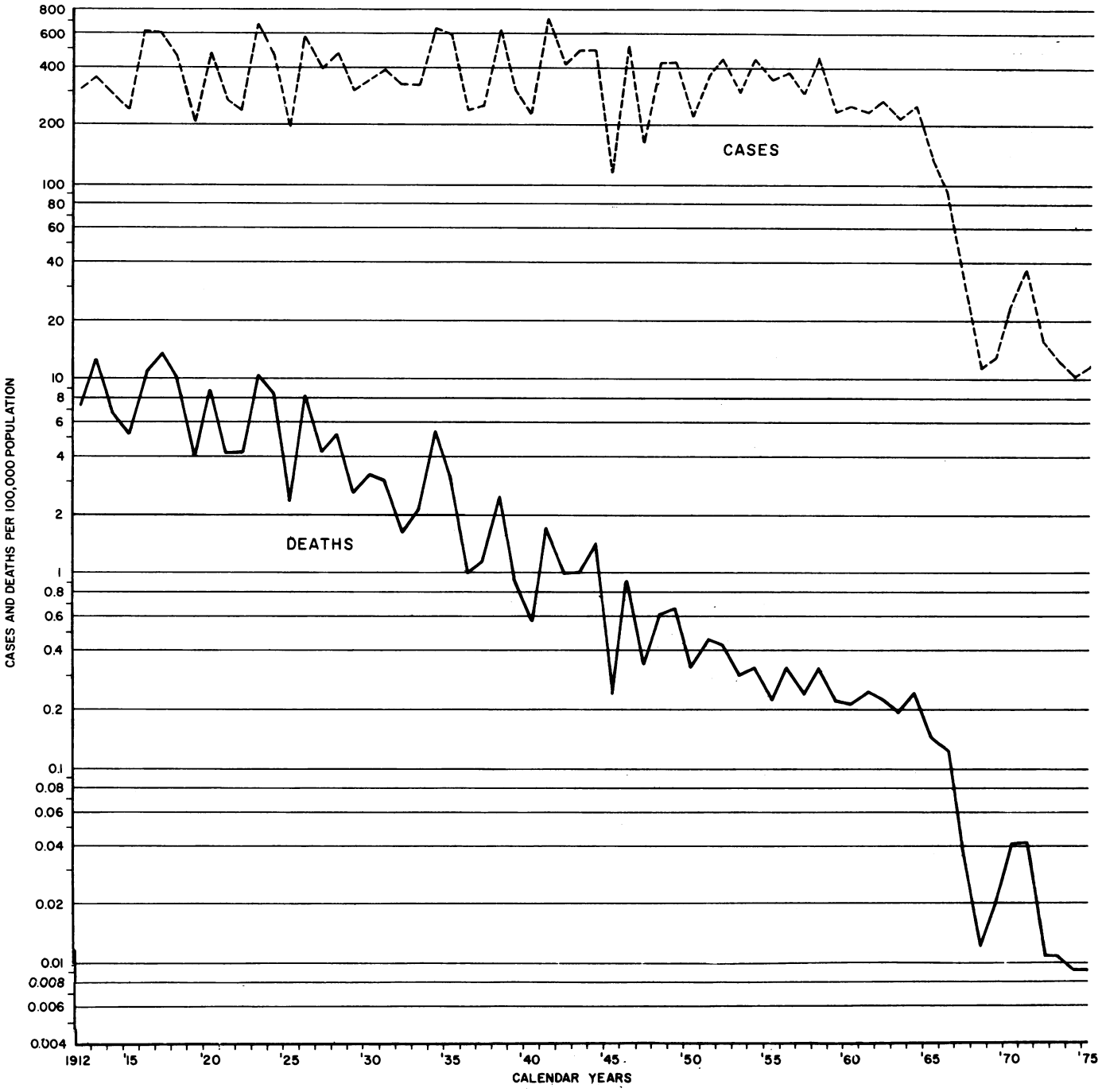

FIGURE 1—Reported Measles Cases and Death per 100,000 Population, United States 1912–1975

residents of metropolitan counties and 83 in residents of non-metropolitan counties (Table 2). However, since the population in metropolitan counties is nearly three times that of non-metropolitan counties, measles death rate was nearly three times higher in non-metropolitan than in metropolitan counties.

There was an inverse correlation between median annual family income of a county and measles death rates of a county, with measles death rates being nearly 10 times higher in counties where median family income was less than $5,000 than in counties where median family income was over $10,000 (Table 3).

For the period 1973–1975, the highest death rate due to measles and the highest death-to-case ratio were seen in those less than one year of age (Table 4). Of the 13 deaths in children under one year of age, 11 occurred in the 6–11 month age group. Both the death rate and the case rate of measles declined with increasing age. The death-to-case ratio followed a U-shaped pattern with the trough being in the 5–9 age group (Table 4).

TABLE 2—Deaths Attributed to Measles by Metropolitan-Nonmetropolitan County

County	Deaths	Population*	Deaths per Million Population
Metropolitan	82	154,046,200	.54
Nonmetropolitan	83	55,798,000	1.49
Unknown	12**		
Total	177	209,844,200	.84
Annual Average	35.4		

*U.S. Bureau of Census estimate of July 1, 1973.
**The 12 deaths for which county was unknown were excluded from the calculations.

TABLE 3—Deaths Due to Measles by Economic Status of County, United States 1971-1975

Median Family Income	Deaths	Population*	Deaths Per Million Population
≥$10,000	43	94,206,000	0.46
$5,000-$9,999	103	103,972,000	0.99
≤ $4,999	15	3,562,000	4.20
(Unknown)	(16)		

*U.S. Census, 1970

Discussion

The licensure and widespread use of live measles virus vaccine has led to a decrease of greater than 90 per cent in both the incidence of reported measles cases and in reported measles death rates. Since the deaths reported include only those in which measles was listed as the underlying cause of death, the reported rates represent a minimum estimate of deaths in which measles was a significant factor.

Measles death rates were three times higher in nonmetropolitan areas than in metropolitan areas. A similar observation was made by Puffer and Serrano in a review of measles-related deaths in Latin America.[7] They speculated that the difference might be due to poorer nutritional status in children living in rural areas. In the United States, it is not known what factors are responsible for this differential, although decreased access to or acceptance of preventive medical services may play a role.

As in previous studies, the highest mortality rate and death-to-case ratio is seen in children less than one year of age and the lowest death-to-case ratio is seen in those 5-9 years of age.

The observed high death rate and high death-to-case ratio in those less than one year of age with almost all deaths occurring in those 6-11 months of age would support the recommendations of vaccination of infants as young as six months of age when there is a risk of exposure and the use of immune globulin in those who have been exposed to measles cases. Children vaccinated before one year of age should be revaccinated when 15 months of age or older.[8, 9]

The data available do not permit analysis of other factors which might have contributed to measles deaths, such as underlying neoplasm, chronic illness, etc. Additionally, the data available did not permit an estimate of the possible occurrence of measles deaths in those 12-14 months of age; an analysis which might be of benefit in assessing the impact of the subsequent decision to raise the age of primary immunization from 12 to 15 months.[8, 9]

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TABLE 4—Age Distribution of Cases, Case Rates, Deaths, Death Rates, and Death-to-Case Ratio, United States, 1973-1975

Age Group	Number of Deaths	Deaths per Million Population	Number of Cases	Cases per Million Population	Deaths per 1000 Reported Measles Cases
<1	13	4.22	2,415	784.34	5.38
1-4	21	1.54	8,652	634.54	2.43
5-9	10	0.55	14,109	779.29	0.71
10-14	11	0.53	13,891	767.25	0.79
15-19	4	0.19	4,783	232.74	0.84
20+	4	0.03	1,231	9.18	3.25
Unknown	0	—	28,077	—	—
Total	63	0.30	73,158	347.70	0.86
Annual Average	21	0.10	24,386	115.90	0.86

FIGURE 1—Reported Measles Cases and Deaths per 100,000 Population, United States 1912–1975

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News and Changes Announced on Three Child Health Periodicals

Human Sciences Press has announced several changes in scope and distribution of two child health journals, as well as a call for papers for a new periodical.

The bi-monthly European Journal, *Courrier, The Medical and Social Review of Childhood,* is now available in the Western Hemisphere. Originating from the Center International de L' Enfance in Paris, each issue of *Courrier* presents original research on health, social, and nutritional problems relating to child care, as well as abstracts of approximately 800 articles from current world literature. Institutional subscription rate is $42; individuals $28.

Family and Child Mental Health Journal (formerly *Issues in Child Mental Health*), officially changes its title with Vol. 6, 1980. The journal provides an interdisciplinary approach to child guidance and family therapy, viewed in a comprehensive social and psychological context. Manuscripts and editorial correspondence should be addressed to Paul Pressman, MD, Editor, c/o Jewish Board of Family and Children's Services, Inc., 120 W. 57th St., New York, NY 10019. Published semi-annually, subscription rates are: $24, institutions; $12, individuals.

Infant Mental Health Journal, official journal of the Michigan Association for Infant Mental Health, has issued a call for papers. The first periodical of its kind to provide both health care practitioners and social scientists with an interdisciplinary forum for significant research and service developments in the infant care area, this quarterly journal will explore a variety of current treatment approaches and innovative concepts for a wide range of medical and psycho-social perspectives. Manuscripts and editorial correspondence should be sent to the editor, Dr. Jack Stack, Alma Family Health Research, Education and Service Institute, 510 Prospect St., Alma, MI 48801. Annual subscription rates: $35, institutions; $18, individuals.

Subscription inquiries for any of the three journals described above should be addressed to the publisher, Human Sciences Press, Inc., 72 Fifth Avenue, New York, NY 10011.